

The doctor with an inherited defect of colour vision: effect on clinical skills

J ANTHONY B SPALDING

Introduction

INHERITED defective colour vision is a common sensory deficiency of varying severity.¹ A great deal is known about the defect but little about how much it can impair the clinical skills of doctors. At this stage I must admit that I have such a defect, which gives me a special interest in the subject, with the possibility of a special understanding.

People tend to be baffled by the subject and the resulting handicap, whether they have the defect or not, but it is still surprising that we in the medical profession do less for our colleagues with this defect than is done for those in many other occupations, for example various types of electrical work and certain grades in the police and armed forces.² This is probably due in part to the incorrect assumption that doctors can look after themselves in this matter.

It is the general practitioner who is the main concern of this article, but the defect will also affect the work of medical students, specialists, nurses, some other medical workers and to some extent dentists. I will try to evaluate the impairment of clinical skills as a result of defective colour vision and in doing so will refer to my own experiences as well as those of others.

The deficiency

Knowledge can confound when it is wrongly thought to be the whole of a subject. What doctors learn at medical school about colour vision is certainly not the whole story and later in their careers the subject is seldom brought to their attention.

One in 12 males (8.3%) and one in 200 females (0.5%) in Caucasian countries have inherited defective colour vision.¹ This usually affects the red or green part of the spectrum. Over 2% of males are dichromats who have a severe defect.¹ The defect of the remainder can range from only slight differences from normal vision to nearly as great a defect as occurs among dichromats.³ The abnormality is recessive and linked to the x-chromosome.

Children are screened for defective colour vision using the Ishihara test as part of the school medical service, most commonly between the ages of 10 and 12 years. However, this does not assess severity and the advice that children and their parents receive varies.¹ An expensive anomaloscope is needed to assess the severity of the defect. All ophthalmic departments can screen for colour deficiency and can usually assess the severity of the defect; optometrists can screen for a defect but few can assess its severity.

There is no generally applied pre-vocational counselling for doctors with defective colour vision and there is little evidence of the proportion of doctors who have the defect. However, at a conference of 102 doctors in 1976 it was found that 59% had not had their colour vision tested at any time and five were found to have a defect.²

It is not commonly realized that those with the usual red-green

defects can have problems discriminating within a whole range of colours — not only reds and greens but browns, yellows, oranges and purples may be involved. Those with a mild defect will only confuse pale or dark colours but those with a severe defect will also confuse bright colours. Importantly, those with such a defect sometimes remain unaware of their problem until faced with a critical choice where there is no other clue to the correct answer.

Defective colour vision is different from deafness in that it is discovered later in life. This is often when screened either at school or when applying for certain types of work, or when an error over a choice of colour is made. This delay in discovery gives time for adaptations to be made, some good and some bad. For example, a person with a defect uses clues to make shrewd guesses about a colour. The context can give a strong clue and brightness and saturation can also help. As a result the handicap may not be as noticeable as might be expected. But this use of clues leads to situations in which the person with defective vision thinks that what is seen identifies a specific colour when in fact it often does not. This is perhaps the main cause of the lack of insight which can last for a lifetime.

Between 1965 and 1970 Taylor studied the career choice of 831 children with defective colour vision. To his surprise he found that two out of three had chosen a career where the defect would be a problem.⁴ In 1971, from his study of children in the educational context, Bacon wrote that he believed that they learned to hide their defect.⁵ This is a common observation. This tendency to hide the defect, which may be partly unconscious, persists among adults and must increase the general tendency to play down or ignore the problem.

Accidents and difficulties

To write about accidents resulting from defects of colour vision is not to be alarmist but to give some idea of the problems that may be caused by the condition. I have read of no serious accidents that have occurred as a result of defective colour vision among the medical profession and those that occurred in the past as a result of defects among those in other walks of life apparently no longer occur.

In 1883, Jeffries wrote about the difficulties faced by those with defective colour vision in many occupations.⁶ Among others he cites a bookbinder, an architect, a weaver, a physician, a post office clerk and a farmer. He wrote that 'volumes might be written on the subject if all the embarrassments to which they gave rise were cited'. Serious nautical accidents occurred before those working in navigation were tested for the defect.⁷ A collision on the River Elbe in 1902 involved the loss of 107 lives and was shown to be a result of a defect of colour vision.⁸

In certain occupations perfect or near perfect colour vision is required. In 1980, Voke wrote a valuable report on her three year investigation into industries and professions.² In her section on the medical profession she wrote of the admitted difficulties of a nurse, a physician, an anaesthetist and an ophthalmologist. Cyanosis, jaundice, retinal changes, the colours of body fluids, and blood in vomit are all referred to as causes of difficulty. She also gave an account of her investigation of the skills of endoscopists and demonstrated some difficulties in the procedure for those with a defect of colour vision.

J A B Spalding, MRCP, retired general practitioner, Newham, London. Submitted: 14 April 1992; accepted: 7 August 1992.

© *British Journal of General Practice*, 1993, 43, 32-33.

In their book *Defective colour vision* Fletcher and Voke classified surgeons and physicians as among those for whom good colour vision is desirable but for whom a defect is not necessarily a cause of handicap.¹ However, they also wrote that the physician, surgeon or nurse with a severe defect is likely to be at great disadvantage where colour changes aid diagnosis and that, especially where the defect remains undetected, the potential risk to the patient may be significant.¹ Doctors with defective colour vision often say that they manage to get round the problems caused by their defect.² This may often or even usually be true, but still the question has to be asked: do they always know when they have missed something?

Personal account of defective colour vision

I myself am a deuteranope, that is, I lack receptors for green. When aged seven years my water colour of a pink rose was green. Although I realized soon after this event that I had some defect of red-green vision I did not appreciate its extent until shortly after my retirement following 25 years in general practice. It was then that I had tests which showed the exact nature and degree of my defect. At first I was embarrassed that I had not realized the full extent of my condition much earlier but later I realized that it is characteristic of those with this defect to be only partly aware of it. Retirement has helped me to look more objectively at the difficulties I once had.

I remember missing the pallor of severe anaemia, a condition which was quite clear to others. I had difficulties detecting traces of blood, cyanosis and the green look which I understand is sometimes a sign of severe illness. I also did not have the quick gut reaction to the blush, for example concern or embarrassment, and no doubt to other effects of colour that most people find startling.

On reading the literature on defective colour vision I found no article written by a doctor describing his or her own difficulties. This is striking. Some people with the defect may decide to avoid a career in medicine but perhaps more likely reasons are the known psychological attitudes of those with a defect^{2,5} and the fact that for doctors the defect is seen as a threat to competence with the result that any admission would be seen as compromising their position.

General practitioners

In their encounters with patients doctors use knowledge and experience, reason and feelings, and the five senses. General practitioners use a scanning process to note clues. An abnormal colour could be such a clue, for example pallor, jaundice, cyanosis or pink urine. It may be that such a clue is not essential in formulating the final diagnosis but it may be an essential guide to action, such as referring the patient for another opinion. The use of special investigations would avoid certain difficulties presented by defective colour vision but to use these frequently for this reason is scarcely a wise or a practical option.

The general practitioner deals with many natural and pathological processes and when colour is involved in these the tasks are often not circumscribed as they are in the work of, for example, an electrician or certain types of medical practitioners such as the radiologist or the bacteriologist. The general practitioner, like other clinicians, is presented with a lifelong learning process where colour plays a part.

Certainly for most tasks in general practice awareness of the defect of vision will allow the doctor to avoid difficulties. However, for those with a severe defect some difficulties may be unavoidable.

Conclusion

Defective colour vision can cause difficulties for doctors and is likely to impair clinical skills in certain situations. Those with a severe defect and those who do not know of their defect are likely to face the most difficulties. It follows that the present *laissez-faire* policy of the profession is inappropriate. All doctors should have pre-vocational screening and those with the defect should be counselled. It is possible that those with a severe defect should avoid certain branches of medicine. This may apply to general practice but more evidence for this is needed before a firm conclusion can be drawn.

It is possible that my own defect has given me a certain bias, but the conclusions presented here can be tested and with the help of others I am planning to do this.

References

1. Fletcher R, Voke JE. *Defective colour vision*. Bristol: Adam Hilger, 1985: 142, 446-447, 453-454, 471-472.
2. Voke JE. *Colour vision testing in specific industries and professions*. London: Keeler, 1980.
3. Hunt RGW. *Measuring colour*. New York: Ellis Horwood, 1987: 35.
4. Taylor WOG. Effects on employment of defects in colour vision. *Br J Ophthalmol* 1971; 55: 753-760.
5. Bacon L. Colour vision defects — an educational handicap. *Medical Officer* 1971; 125: 199-209.
6. Jeffries BJ. *Colour blindness — its dangers and detection*. Cambridge, MA: Riverside Press, 1883.
7. Holmgren F. Colour blindness and its relation to accidents by rail and sea. *Smithsonian Rep* 1887; 131-195.
8. Guttemann A. Eigene Erfahrungen eines Farbenschwachen auf Binnengewässern und auf See [Experiences of a person with defective colour vision on inland waterways and at sea]. *Hansa Deutsche Nautische Zeitschrift* 1907; Z.44 (15): 186-189.

Address for correspondence

Dr J A B Spalding, 5 Curzon Road, Weybridge, Surrey KT13 8UW.

RCGP Publications PATIENTS AND DOCTORS

Patients and their Doctors (Occasional Paper 8)

Cartwright and Anderson follow up their classic work on patients' views of their doctors. A useful source document on patient opinion. £3.00

Doctors Talking to Patients

Byrne and Long's well-known book was the first to illustrate the potential for using modern recording methods to analyse the problems of doctor-patient communication. £10.50

To Heal or to Harm — The Prevention of Somatic Fixation in General Practice

Describes not only the theory of somatic fixation and how doctors, patients and others contribute to this, but also practical ways in which it can be prevented. £12.50

The Longest Art

There have been few books about continuity of care in general practice but one of the first to describe it, not simply over years but over generations, was Dr Kenneth Lane. The College republishes it today in order to keep an important text in print, enabling this delightful story to be made available to GPs and trainees. £15.00

All the above can be obtained from the Sales Office, Royal College of General Practitioners, 14 Princes Gate, London SW7 1PU (Enquiries, Tel: 071-823 9698). Prices include postage. Payment should be made with order. Cheques should be made payable to RCGP Enterprises Ltd. Access and Visa welcome (Tel: 071-225 3048, 24 hours).